

EU F-Gas Regulation Guidance

Information Sheet 14:

Refrigeration, Air-Conditioning and Heat Pump Contractors

Target audience for this Information Sheet

This Information Sheet is aimed at contractors that carry out installation, maintenance and decommissioning work on refrigeration, air-conditioning and heat pump systems (RACHP). It is also useful for operators of RACHP systems that use 3rd party contractors to maintain their plant.

1. Background

This guidance is for organisations affected by the 2014 EU F-Gas Regulation (517/2014). The F-Gas Regulation creates controls on the use and emissions of fluorinated greenhouse gases (F-Gases) including HFCs, PFCs and SF₆.

Contractors play a major role supporting operators of refrigeration, air-conditioning and heat pump (RACHP) equipment. They have to comply with a number of requirements under the F-Gas Regulation. The 2014 EU F-Gas Regulation replaces the 2006 Regulation, strengthening all of the 2006 requirements and introducing a number of important new measures.

The F-Gas Regulation is an important piece of legislation that will result in significant reductions in the emissions of F-Gases. These are very powerful greenhouse gases, with global warming impacts that are several thousand times higher than CO₂ (per kg of gas emitted). All EU Member States agree that it is important to reduce emissions of these gases.

This Information Sheet describes the requirements that apply to RACHP contractors. Further guidance is available – see Information Sheet 30 for a full list and a glossary of terms.

RACHP Contractors: Compliance Checklist for EU F-Gas Regulation

- ✓ **NEW:** Advise customers about the impact of HFC bans, the service ban and the phase down on the selection of refrigerants for new equipment
- ✓ Ensure the company and all relevant staff have suitable F-Gas training and certification
- ✓ **NEW:** Comply with new legal responsibility on contractors to prevent leaks
- ✓ Ensure new plants are properly labelled during installation
- ✓ **NEW:** Ensure mandatory leak checks and repairs are carried out, using the new CO₂ equivalent size thresholds for leak checks and for automatic leak detection
- ✓ **NEW:** Ensure appropriate records are kept by both contractor and operator
- ✓ **NEW:** Advise operators to make early preparations for the service ban
- ✓ **NEW:** changes to requirements to purchase of refrigerants and pre-charged equipment
- ✓ Ensure proper recovery of refrigerant during maintenance and at end-of-life

2. Sector description

The RACHP sector covers a wide range of equipment and end users, ranging from small domestic and commercial systems to large industrial plant. Key sectors of the RACHP market include

1. Domestic refrigeration
2. Commercial refrigeration
3. Industrial refrigeration
4. Transport refrigeration
5. Stationary air-conditioning and heat pumps
6. Mobile air-conditioning

Detailed guidance on the impact of the 2014 F-Gas Regulation on each of these sectors is available in Information Sheets 1 to 6.

Most operators of RACHP equipment in these sectors make use of specialist contractors for installation and maintenance work. There are over 5,000 RACHP contractors in the UK, ranging from large companies with UK-wide capability to very small businesses working in a small geographic area. The skill and expertise of the RACHP contracting industry is crucial, providing operators with various services through the life cycle of RACHP equipment.

The F-Gas Regulation places legally binding obligations on contractors to ensure that they help end users minimise the use and emissions of high GWP¹ refrigerants. It is important that contractors comply with the Regulations that apply to them and also that they are aware of other relevant parts of the F-Gas Regulation so that they can provide their clients with appropriate advice.

3. Advice regarding purchase of new equipment

Contractors often provide important advice to their clients about purchase of new equipment. In the 2014 F-Gas Regulation there are 3 important new requirements that will change the advice that contractors give to their clients. These are:

- a) Various specific bans, that will require lower GWP refrigerants to be used
- b) The impact of the HFC phase down, that will encourage use of low GWP refrigerants
- c) The impact of the service ban, which affects the purchase of new systems using high GWP refrigerants such as HFC 404A

NEW: HFC Bans

The 2014 Regulation includes a number of HFC bans as summarised in Table 1. Contractors should be aware that these bans “do not tell the full story”. You must make clients aware of the phase down and the service ban (see below) – these also have a significant influence on selecting new plant.

NEW: Impact of the Service Ban on purchase of new equipment

Purchasers of new commercial and industrial refrigeration equipment must be aware that a “Service Ban” will affect certain **existing** systems using HFCs with a GWP above 2,500 from **2020**. The ban applies to systems containing more than 40 tonnes CO₂ equivalent (10 kg for HFC 404A). To avoid future problems you should advise clients purchasing plants above this size threshold to select only

¹ GWP, Global Warming Potential: see Information Sheet 25 for details about GWP

refrigerants with a GWP below 2,500, with immediate effect. The service ban is discussed in more detail in Section 7, below.

NEW: Impact of the HFC Phase Down on the purchase of new equipment

When purchasing new RACHP equipment your clients should also consider the HFC phase down². This will reduce the quantity of HFCs that can be sold in the EU – by 2030 there will be an 80% cut in HFC supply. Equipment bought now will still be operating when deep cuts in HFC supply are in force. Irrespective of the bans described above, it makes sense to always purchase equipment using refrigerants with the lowest practical GWP to minimise the future impact of the phase down³.

Table 1: Bans affecting RACHP Equipment

Market Sector	Product Description	Scope of banned F-Gases	Start Date ⁴
Refrigeration	Non-confined direct evaporation systems	All HFCs and PFCs	2007
	Domestic refrigerators and freezers ⁵	HFCs with GWP > 150	2015
	Refrigerators and freezers for commercial use (hermetically sealed) ⁶	HFCs with GWP > 2,500	2020
		HFCs with GWP > 150	2022
	All stationary refrigeration equipment ⁷	HFCs with GWP > 2,500	2020
	Multipack central systems for commercial use ⁸	F-Gases with GWP > 150	2022
Air-conditioning	Moveable, hermetically sealed air-conditioning	HFCs with GWP > 150	2020
	Single split systems containing 3 kg or less	F-Gases with GWP >750	2025

4. Contractor training and certification requirements

All refrigerant handling operations on RACHP equipment containing HFC refrigerants must be carried out by suitably trained technicians holding an F-Gas handling certificate and working for an F-Gas certificated company. This includes plant installation, leak testing, refrigerant recovery, maintenance and end-of-life decommissioning. The training and certification requirements are based on those already specified in the 2006 F-Gas Regulation.

Existing individual F Gas qualification certificates remain valid in accordance with the conditions under which they were originally issued. This means that those who hold certificates with an expiry date (CITB J11-J14) will need to be re-assessed and an updated assessment is now available.

² HFC phase down: see Information Sheet 28 for further details

³ Low GWP alternatives to HFCs: see Information Sheet 29 for further details

⁴ All start dates are January 1st of year specified

⁵ This ban includes both refrigerant and foam blowing agent

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⁷ Exemption for equipment cooling products below -50°C

⁸ The primary circuit of cascade systems can use an HFC with a GWP up to 1,500

NEW: The certification requirements have been extended to include technicians working on refrigerated trucks (>3.5 tonnes) and refrigerated trailers.

NEW: Qualified technicians must also be given “*information on relevant technologies to replace or to reduce the use of fluorinated greenhouse gases and their safe handling*”. No further assessments are required, but all technicians should be aware of relevant information about the use of alternatives. It is expected that standard information will be prepared and then circulated via Certification Bodies.

Company Certification is required by all contractors carrying out installation and maintenance work. This applies to sole traders as well as limited companies. The process is unchanged from the 2006 Regulation. Defra has designated three bodies that can issue an RACHP Company Certificate: Refcom, Bureau Veritas and Quidos.

See Information Sheet 21 for details of all RACHP training and certification requirements.

5. Contractor responsibilities to minimise refrigerant emissions

Under the 2006 F-Gas Regulation the legal responsibilities related to F-Gas emissions from RACHP equipment were held only by the plant operator (usually the owner).

NEW: In the 2014 Regulation there is an explicit legal requirement for contractors to share this responsibility. Article 3 of the Regulation states that “*The intentional release of F-Gases into the atmosphere shall be prohibited where the release is not technically necessary for the intended use.*”

The Regulation then states that contractors “*carrying out the installation, servicing, maintenance, repair or decommissioning of RACHP equipment shall be certified and shall take precautionary measures to prevent leakage of F-Gases*”.

This is an important new requirement about which contractors may need to inform a client, if they are being asked to do something that does not comply with the Regulation.

6. Contractor responsibilities during plant installation

All contractor staff carrying out installation work related to refrigerant handling must hold the appropriate F-Gas handling certificate and must make precautionary measures to prevent leakage. Engineers carrying out unrelated installation activities (e.g. electrical work) do not need a refrigerant handling qualification. However, anyone doing work that could affect the refrigerant circuit and give rise to possible leakage must be qualified – e.g. an engineer setting a high pressure cut-out device should be qualified – if this was set incorrectly it could give rise to a leak.

Product Labelling

All RACHP products that contain F-Gases (including HFCs) shall not be placed on the market unless the F-Gases are identified with a label. The label shall indicate the following information:

- 1) A reference that the RACHP system contains F-Gases
- 2) The accepted industry designation for the F-Gas concerned or, if no such designation is available, the chemical name
- 3) **NEW:** From 1 January 2017, the quantity expressed in weight and in CO₂ equivalent of F-Gas contained in the equipment, and the global warming potential of the gas
- 4) If applicable, a reference that the F-Gases are contained in hermetically sealed equipment

For some pre-charged RACHP equipment the label will be provided by the equipment manufacturer. However, for all RACHP systems that are filled or topped up with refrigerant during installation, it is the responsibility of the installation contractor to ensure that a suitable label is attached, stating the total amount of refrigerant in the system.

7. Contractor responsibilities during maintenance activities

The 2014 F-Gas Regulation includes a number of requirements that affect the use and maintenance of existing industrial refrigeration equipment containing HFC refrigerants. The rules depend on the type and size of industrial refrigeration equipment being used. The regulations affecting existing equipment relate to (a) leak prevention, (b) record keeping and (c) the Service Ban. These requirements are described below.

Mandatory leak checks

Mandatory leak checks are required on all RACHP equipment above certain size thresholds.

Under the 2006 F-Gas Regulation, the thresholds were set in terms of the physical quantity of refrigerant in the system – those containing more than 3 kg required a regular leak check.

NEW: Under the 2014 Regulation the requirements are similar, but the size thresholds are defined in terms of tonnes CO₂ equivalent⁹. These new CO₂ equivalent (CO₂ e) size thresholds mean that the kg threshold for each refrigerant is different. Refrigerants with a high GWP (e.g. HFC 404A) will have a lower size threshold than refrigerants with a lower GWP (e.g. HFC 134a). Table 2 shows leak testing requirements under both Regulations. Example thresholds are given for HFC 404A and HFC 134a. A comprehensive table of thresholds is given in Information Sheet 25.

The new CO₂e thresholds will require some systems below the old 3 kg threshold to be regularly leak tested. As shown in Table 2, the size threshold for HFC 404A is only 1.3 kg. Contractors should check which of the systems they maintain are affected by the new CO₂e size thresholds. Most of the leak checking rules apply from 1st January 2015, continuing the similar requirement in the 2006 Regulation. For systems with less than 3 kg, the 5 tonnes CO₂e threshold only applies from 1st January 2017.

Table 2: Size Thresholds for Mandatory Leak Checks

Leak Check Frequency*	2006 Regulation	2014 Regulation		
	kg threshold for all HFC refrigerants	tonnes CO ₂ e threshold for all HFC refrigerants	kg threshold for HFC 404A	kg threshold for HFC 134a
Annual	3 kg	5 tonnes CO ₂ e **	1.3 kg	3.5 kg
Every 6 months	30 kg	50 tonnes CO ₂ e	13 kg	35 kg
Every 3 months	300 kg	500 tonnes CO ₂ e	127 kg	350 kg

* Leak check frequency is halved if automatic leak detection system is installed

** The threshold for annual leak checks of hermetically sealed equipment is 10 tonnes CO₂e

If a leak is found during a mandatory leak check it must be repaired without undue delay and the leak test repeated within one month to ensure the repair was effective.

⁹ Understanding CO₂ thresholds: see Information Sheet 25 for further details

Mandatory automatic leak detection

For all RACHP systems containing over 500 tonnes CO₂e there is a mandatory requirement for an automatic leak detection system to be fitted. An automatic leak detection system is defined as a “calibrated mechanical, electrical or electronic device for detecting leakage of F-Gases which, on detection, alerts the operator or a service company of any leakage”.

NEW: Mandatory automatic leak detection is a continuation of a similar requirement in the 2006 Regulation, although the size threshold is changed from 300 kg to 500 tonnes CO₂e. This will have a significant impact on plants using high GWP refrigerants. For HFC 404A systems the new threshold for automatic leak detection systems is reduced from 300 kg to 127 kg.

This rule applies from 1st January 2015. The lower size threshold for HFC 404A will affect many large refrigeration systems as they often contain more than 127 kg. Table 3 shows the size threshold for automatic leak detection for a number of refrigerants used in RACHP systems. For most refrigerants, the new size threshold is lower than the 300 kg threshold in the 2006 Regulation.

Automatic leak detection systems must be tested every 12 months to ensure their proper functioning.

Table 3: Size Thresholds for Automatic Leak detection and the Service Ban

Refrigerant	GWP	Auto leak detection: kg equivalent of 500 tonnes CO ₂ e	Service Ban kg equivalent of 40 tonnes CO ₂ e
HFC 508B	13,396	37	3.0
HFC 507	3,985	125	10.0
HFC 404A	3,922	127	10.2
HFC 434A	3,245	154	12.3
HFC 422D	2,729	183	14.7
HFC 438A	2,264	221	n/a*
HFC 410A	2,088	239	n/a*
HFC 407C	1,774	282	n/a*
HFC 134a	1,430	350	n/a*

* Note: the service ban only applies to refrigerants with a GWP above 2 500

Record keeping

Operators must ensure records are kept for each piece of equipment that is subject to a mandatory leak check (i.e. above the 5 tonnes CO₂e threshold). The records are similar to those required under the 2006 Regulation:

- a) quantity and type of F-Gas installed
- b) quantities of F-Gas added during installation, maintenance or when repairing a leak
- c) **NEW:** whether the F-Gases used have been recycled or reclaimed (including the name and address of the recycling or reclamation facility and, where applicable, the certificate number).
- d) quantity of any F-Gases recovered
- e) the identity of the undertaking that installed, serviced or decommissioned the equipment, including, where applicable, their certificate number
- f) dates and results of all mandatory leak checks
- g) **NEW:** if the equipment was decommissioned, the measures taken to recover and dispose of the F-Gases.

NEW: Records must be kept by the plant operator for at least 5 years. Where a contractor prepares records for the operator, the records should also be kept by the contractor for at least 5 years. The records shall be made available on request to the UK Government's competent authority (i.e. the Environment Agency) or to the Commission.

NEW: Service Ban

An important new feature of the 2014 F-Gas Regulation is the Service Ban:

- From 1st January 2020 the use of F-Gases with a GWP above 2,500 to maintain refrigeration systems with a charge size of 40 tonnes CO₂e or more shall be prohibited.

In the refrigeration sector this will mostly affect systems that use HFC 404A. The size threshold of 40 tonnes CO₂e is equivalent to 10 kg of HFC 404A. The size thresholds for various other refrigerants are given in Table 3.

It is important to note that several refrigerants used as "drop-in" replacements for R22 have a GWP above 2,500 and are affected by the Service Ban. Some of these are listed in Table 3 (e.g. HFC 434A, HFC 422D).

It will be legal to continue operating systems affected by the Service Ban, but you will not be allowed to top up any leaks with virgin refrigerant. Contractors should advise operators of equipment affected by the Service Ban that they have 3 main options:

- a) They can replace the plant with new equipment using a refrigerant with a lower GWP. This is a good option for plants close to end-of-life.
- b) They can "retrofill" the plant, replacing the refrigerant with a lower GWP alternative (for HFC 404A you can use alternatives such as HFC 407A, HFC 407F, HFC 448A and HFC 449A for most applications). This option is a good one for younger equipment. There is good evidence that retrofilling HFC 404A with one of these refrigerants will improve energy efficiency by between 5% and 10% - this creates a good financial case for retrofill.
- c) You can use reclaimed or recycled refrigerant for plant maintenance until 1st January 2030.

8. Purchase of bulk refrigerant and pre-charged systems

NEW: HFC refrigerants¹⁰ shall only be sold to and purchased by certified undertakings or undertakings that employ certificated personnel¹¹. This means that refrigerant suppliers will require evidence that contractors are certified or qualified to make the purchase. You should contact your refrigerant suppliers to confirm what new requirements they plan to introduce – it is likely to be evidence based on your Company F-Gas Certificate.

NEW: Non-hermetically sealed equipment pre-charged with HFCs (e.g. split system air-conditioning units) can only be sold to end-users where evidence is provided that the installation will be properly carried out by a suitably qualified contractor.

¹⁰ This applies to bulk refrigerant sold in cylinders of any size

¹¹ The purchase rule applies to refrigerant sold for the purposes of carrying out the installation, servicing, maintenance or repair of equipment containing F-Gases. Equipment manufacturers that purchase bulk refrigerant to factory-fill their equipment are not affected by this rule.

9. Contractor responsibilities for plants at end-of-life

Any RACHP equipment containing HFCs in either the refrigeration circuit or the insulation foam that is being disposed of at end-of-life must undergo an HFC recovery process.

All refrigerant must be recovered by a certificated technician before the plant is dismantled. Modern refrigerant recovery machines should be able to remove well over 95% of the refrigerant in an old system. Any insulating foam associated with these refrigeration systems (e.g. PU foam used for pipe / vessel insulation or in cold store panels) should be sent to a specialist recovery facility, where the foam can be crushed and the HFCs recovered.

All recovered F-Gases can either be:

- a) sent for destruction by incineration at a licenced waste facility
- b) sent to a specialist plant that can re-process the old refrigerant into a gas with properties identical to virgin refrigerant, to create “reclaimed refrigerant”
- c) given a basic cleaning process, to create “recycled refrigerant”.

Given the HFC supply shortage that will be created by the phase down process, it is worth trying to send the old refrigerant for reclamation as it may have a good residual value. If the old refrigerant is too contaminated it cannot be reclaimed and must be sent for destruction. It is important not to mix different gases in the same recovery cylinder – as this would render them unsuitable for reclamation.

Reclaimed refrigerant may be used in any refrigeration equipment, by any qualified person. Recycled refrigerant must always be used with care as it may be contaminated or of unknown composition. The use of recycled refrigerant with a GWP above 2,500 is restricted to either (a) the organisation owning the plant from which the gas was recovered or (b) the organisation that carried out the recovery.

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This Information Sheet has been prepared by Gluckman Consulting

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